SYSTEM SUPPORT DIRECTIVE

ASR-9 | 6310 | SSM-ASR9-004

System Support Modification

UPGRADED MODE-S INTERFACE SUPPORT

Highlights
- Better coordination
- Improved visibility
- Many problem fixes

March 13, 1998

1. PURPOSE. This chapter authorizes a modification to the Remote Monitoring Subsystem (RMS), the Message Interface Processor (MIP), and the System Control and Configuration (SCC) computers embedded within the Airport Surveillance Radar-9 (ASR-9) system. This modification provides upgrades to the firmware within these subsystems.

2. DISTRIBUTION. This directive is distributed to selected field offices and services within Washington headquarters, regional Airway Facilities divisions, William J. Hughes Technical Center, Mike Monroney Aeronautical Center, and the Airway Facilities offices having the following facilities/equipment: ASR-9.

3. WITHDRAWALS/CANCELLATIONS. Not applicable.

4. REFERENCES.

   a. Configuration Control Decisions (CCD) N18702, N18704, and T18486.

   b. Hardware Discrepancy Reports (HDR) 02235009NM, 04116024V, 04116031V, 04196032V, 04196033V, 04275016V, 04275017V, 04306037V, 04306038V, 04306039V, 07065037V, 07185038V, 07275040V, and 10025043V.

   c. System Support Modification (SSM) MODES-002, MODE-S Image and Interface Modification, Type FA-10203/1 and FA-10202.

   d. Case File SCTAF-ASR-002.

5. BACKGROUND.

   a. The current ASR-9/Mode Select Beacon System (MODE-S) interface uses a set of discrete lines for control purposes; and a set of clock/data lines for message transport. Providing for failure situations increased the complexity of the ASR-9's MODE-S interface logic. The core of the problem is that the control discretes can not closely

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reflect the actual condition of the message bearing signals. This modification, along with its MODE-S partner, will eliminate all use of the discrete lines in favor of a purely message oriented approach.

b. The current ASR-9/MODE-S interface transfers target report messages, and makes no attempt to determine if the messages were successfully received by the other side. This modification, along with its MODE-S partner, will make extensive use of Advanced Data Communication Control Procedure (ADCCP) features to determine whether target/status messages are getting through, inform the other side of status changes, and support switch actions requested by MODE-S.

c. The current ASR-9/MODE-S interface does not provide for "graceful" shutdown or channel change in response to operator commands. This is especially noticeable when the radar is put into "Manual ASR-9" mode (Interim Beacon Interrogator (IBI)). The MODE-S system performs a series of switch actions before ending up in IBI mode (1155 traps). This sequence of events can take up to 15 seconds. This modification, along with its MODE-S partner, will support smooth channel changes and immediate transfers to IBI mode in response to certain operator commands or system faults.

> **VERY IMPORTANT:** This modification will <u>not</u> enable the ASR-9 to bring the MODE-S system out of IBI mode. Configuring the ASR-9's data source selection for "Manual MODE-S" will have no effect on the MODE-S system. A MODE-S reset or "Exit IBI" command will still be required to get the two systems into MODE-S operation. What has changed is that either system will be able to bring the two systems back to IBI mode faster, in response to user input.

d. The current ASR-9/MODE-S interface provides little or no visibility into alternate, or unused paths between the two systems. The "usability" of these paths is not tracked by either system. The previously deployed ASR-9/MODE-S interface had to switch to a given path before it could determine its usability. This modification improves visibility by supporting MODE-S initiated path checks on either a continuous or periodic basis. A working path is known, and can be switched to immediately.

> **IMPORTANT:** Due to an architectural limitation in the ASR-9's post processor, the paths <u>from</u> the MODE-S standby Data Processing Subsystem (DPS) <u>to</u> both ASR-9 post processors can not be checked when MODE-S is online. This limitation does not impact IBI mode, where all paths between the two systems are checked every 3 seconds. When MODE-S is online, all paths to and from the MODE-S online DPS are checked. Also, the standby DPS performs a "listen only" test on the paths <u>from</u> each ASR-9 post processor.
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> **NOTE:** Due to the same architectural limitation in the ASR-9's post processor, this modification will not attempt to collect and display status information about all paths between the two systems. While this

modification to the ASR-9 does upgrade the MODE-S interface alarms coverage and adds MIP performance count information (RMS screen 0.3.2.2), the MODE-S system architecture turned out to be much better suited to collecting status information about the paths between the two systems. Refer to the MODE-S local terminal, and related documentation.

e. Numerous field sites have noted that the ASR-9/MODE-S interface tends to be disrupted or go down completely when modem communication problems occur. This behavior has also been seen in the presence of very heavy target data loading. The primary cause of these interface problems is target data backing up in the ASR-9 MIP computer; eventually causing the ADCCP board to overload, and perform an internal hardware-only reset. This leaves the ADCCP board in a non-operational state, which MODE-S interprets as a failure condition. This modification handles backed up target data in a manner that prevents the ADCCP board from overloading.

f. When the radar was configured for "Manual ASR-9" data source configuration, the MIP's MODE-S interface logic continues to inform MODE-S of its "readiness" for full MODE-S operation, even though that is actually not possible. Since field sites have experienced situations where the two systems end up in opposite states, this modification will ensure a MODE-S return to IBI when the radar is forced to that state by manual command.

g. When MODE-S is online, the ASR-9's six target window function does not compensate for the larger boresight delay characteristics of MODE-S outputs. As a result, the MIP was "closing" the window before the desired target message(s) had even arrived. This modification compensates for MODE-S boresight delay characteristics by keeping the six target window "open" two sectors longer.

h. When MODE-S is switched from IBI mode to MODE-S online mode (not the other way), small transient groups of invalid Common Digitizer (CD) messages appear in the ASR-9's output data stream. Investigation revealed the post processor was improperly formatting those targets being stored in the Array Signal Processor's (ASP) merge function at the time of the MODE-S switch action. This modification corrects this transitory situation by detecting the affected messages, and formatting them properly.

i. When the ASR-9's "MODE-S Existence" Variable Site Parameter (VSP) is changed to zero (i.e., no MODE-S) while MODE-S is online, the Local System Control (LSC) Computer would stop tracking MODE-S reconfigurations. As a result, the radar gets stuck in MODE-S configuration, and cannot be switched back to IBI mode. In addition to failing to respond properly to a VSP change, the ASR-9 was also failing to keep MODE-S informed of changes in its "readiness" for combined operation. In this case, the VSP change should have triggered a switch to IBI mode. This modification will respond to the VSP change by switching to "Manual ASR-9" data source configuration, and cause MODE-S to return to IBI.

j. Independent ASR-9/MODE-S interface testing revealed a sequence of actions causing the radar to remain out of synchronization with respect to MODE-S. With MODE-S online, the ASR-9's data source control is changed from "AUTO" to "MANUAL." In this configuration, the ASR-9 will stay in MODE-S mode regardless of what the MODE-S

system actually does; then the MODE-S is switched to IBI, or faulted into that state. When the ASR-9's data source control is changed back to "AUTO," the radar fails to return to IBI mode. It is possible there were similar incidents at field sites in response to data loss situations or "sweep slowdowns." This modification will automatically resume tracking MODE-S reconfigurations when the data source control is changed from "MANUAL" to "AUTO."

k. When a MODE-S system is present, this modification will automatically synchronize the RMS clock with the MODE-S Time-Of-Year (TOY) clock. During startup initialization, RMS will prompt the online post processor for the next TOY value received from MODE-S. If the time value is valid, RMS will set its internal clock. RMS will repeat the prompt at one hour intervals to maintain synchronization. All RMS alarm buffer entries made thereafter will use the new time. If for some reason the TOY information is unavailable, RMS will default to its original requirement of manual input.

l. When the MODE-S is in IBI mode, the status message generated by the ASR-9 does not contain valid information for the beacon channel alarm bits and online beacon channel indicator bit. These bits are defined in the last data word of the ASR-9 status message. The reason for the lack of valid information is that the previous source, the Air Traffic Control Beacon Interrogator (ATCBI)-Radar Beacon Performance Monitor (RBPM) unit, has no counterpart in the MODE-S architecture. This modification, supported by its MODE-S partner, will provide valid information for these bits in IBI mode. This support will also cover the MODE-S specific alarm bits defined in the same word of the status message.

m. The status message generated by the ASR-9 does not include any form of data source indicator. Automation systems and black boxes connected only to the surveillance target outputs of the radar will have no direct means of knowing whether MODE-S is online or in IBI. This modification redefines one of the two remaining "unused" bits in the status message format to reflect the current data source selection. The other remaining "unused" bit will identify whether the beacon channel alarm bits come from the MODE-S system or from the ATCBI-RBPM interface.

n. This modification removes the data source auto/manual selection from the two Remote System Control Panels. The manual data source control was originally intended only for maintenance purposes, but has contributed to a number of full field site outages. Therefore, when system control is transferred to either remote panel, Local SCC will change the data source selection from manual to auto, if necessary. Note that the LSC Panel, Maintenance Processing System (MPS), and all RMS terminals will continue to retain full control over the data source selection.

o. This modification adds an optional audible alarm indication for transmitter/receiver/ synchronizer/Digital Signal Processor (DSP) summary faults in the online channel. This option is enabled by a new system control VSP (E107), and only applies to the two Remote System Control Panels. The LSC Panel will only generate an audible alarm when system control is "up for grabs." This modification also adds an "alarm silence" button to each Remote System Control Panel. When pressed in response to an alarm indication, both Remote System Control Panels will be silenced. When the online channel is no longer summary faulted, the alarm silence function will be reset.

p. The previously deployed MIP (Order 6310.18, Chapter 18, Change 37 dated 7/19/94, MODE-S/ASR-9 Interface FA-10067, FA-10068, and FA-10079) "hangs up" when the patch loopback test is allowed to run for more than a few minutes on the CD/ASR board's First In/First Out (FIFO) number 4 (2 level weather outputs). This error was accidentally introduced during development of that modification. This error does not impact patch loopback testing on FIFO numbers 1 through 3, which are used for the surveillance modems. This modification will fix the problem so all FIFOs can be subjected to unlimited patch loopback testing.

NOTE: The six Phase 1 9PAC installations already have this fix.

q. An incident at Los Angeles International Airport (LAX) revealed that the post processor does not block Fault Isolation Test (FIT) commands when online or in standby. Subsequent source code inspection showed that VSP changes would not be blocked in online or standby modes either. While the incident itself is believed to have been caused by a malfunctioning RMS computer, the post processor should not leave all error checking to RMS alone. This modification will ensure the post processor is in unavailable mode before accepting a FIT command or VSP change.

r. When the post processor resets for any reason, a number of false alarms are reported to the RMS alarm buffer and alarm display screens. Investigation revealed that all but one of these false alarms are caused during the ASP startup sequence, when Beacon Target Detector (BTD) self test replies (alarms 601 through 608) are not being passed to the MIP like they are supposed to. In light of the ASR-9's recently upgraded alarm buffer capability, this modification will eliminate the false alarms associated with post processor startup. There will no longer be a number of alarms, all indicating the same event, just one (MIP Initialization 680).

s. This modification increases the visibility of certain switches on the Remote Surveillance Communications Interface Processor (SCIP) Control Panel. The Main/Alternate and A/B/Remote Online switch settings can be found on the System Status Summary screen (0.3.1.1). Also, changes in these switches will be recorded in the enhanced RMS alarm buffer.

t. This modification introduces a new Firmware Version Readback function to the ASR-9. When RMS screen 0.3.12 is called up, RMS will send a series of poll messages to each embedded processor in the local and remote cabinets. All firmware being deployed in this modification (Local SCC, Remote SCC, and MIP) will recognize the poll, and return the text "SSM 4. New MODE-S I/F." The remaining firmware not changed by this modification (DSP/RM, 6WX/RM, 6WX/SC, SCIP, and ASP), will either ignore the request poll or send back a "rejection" message. In these cases, RMS will display a default "unknown" message that points at the board carrying the firmware chips. Subsequent modifications to these latter processors will support this new readback function.

6. APPLICATION. This modification is applicable to all ASR-9 sites. However, those ASR-9 sites that have the Processor Augmentation Card (9-PAC) modification are not to order kits for this modification. The 9-PAC modified sites will be upgraded independently by the William J. Hughes Technical Center.

7. MATERIALS REQUIRED. The materials required to perform this modification will be supplied in the form of a modification kit. The kit, part number NSN 0000-00-012-1546 consists of 12 Erasable Programmable Read-Only Memories (EPROM) for installation on the RMS Single Board Computer (SBC) 428 EPROM expansion board inside the Intel 310 box, 18 EPROMs for installation on the MIP boards (1D63647 as of Order 6310.18 Chapter 34, Change 47, Message Interface Processor Board Update FA-10067, FA-10068, 1D18925 before), 6 EPROMs for installation on the System Control Interface (SCI) #1 boards (1D18978), 6 EPROMs for installation on the Control Panel Interface boards (1D18982), and 2 lexan switch covers for the Remote System Control Panel assemblies.

ITEM	DESCRIPTION	NSN/PART NUM	QUANTITY
a.	27512 EPROM U5P	1A26051H13	1 ea
b.	27512 EPROM U3P	1A26052H13	1 ea
c.	27512 EPROM U5N	1A26053H13	1 ea
d.	27512 EPROM U3N	1A26054H13	1 ea
e.	27512 EPROM U5M	1A26055H13	1 ea
f.	27512 EPROM U3M	1A26056H13	1 ea
g.	27512 EPROM U5K	1A26057H13	1 ea
h.	27512 EPROM U3K	1A26058H13	1 ea
i.	27512 EPROM U5J	1A26059H13	1 ea
j.	27512 EPROM U3J	1A26060H13	1 ea
k.	27512 EPROM U5H	1A26061H13	1 ea
l.	27512 EPROM U3H	1A26062H13	1 ea
m.	27128 EPROM U20	647A240H16	3 ea
n.	27128 EPROM U30	647A242H16	3 ea
o.	27128 EPROM U21	647A340H20	3 ea
p.	27128 EPROM U23	647A341H20	3 ea
q.	27128 EPROM U30	647A144H16	3 ea
r.	27128 EPROM U31	647A145H16	3 ea
s.	27128 EPROM U50	647A146H16	3 ea
t.	27128 EPROM U51	647A147H16	3 ea
u.	27128 EPROM U60	647A148H16	3 ea
v.	27128 EPROM U61	647A149H16	3 ea
w.	Lexan Switch Cover	646A042H34	2 ea

8. SOURCE OF MATERIALS. The modification kit is to be ordered through the Logistics and Inventory System (LIS) at the Federal Aviation Administration (FAA) Logistics Center. In order to prevent depletion of the material, order only the quantity required. If problems arise in receiving the kit, site personnel should contact National Airspace System (NAS) section, AML-622 directly by telephoning (405) 954-4421.

9. SPECIAL TOOLS AND TEST EQUIPMENT REQUIRED. The following tools are required to complete this modification on an ASR-9 type system:

ITEM	DESCRIPTION	MANUFACTURER	PART/NUMBER
a.	Integrated circuit (IC) insertion/ extraction tool	O.K. Industries, Incorporation	WK-7

ITEM	DESCRIPTION	MANUFACTURER	PART/NUMBER
b.	Electrostatic discharge (ESD) mat	——	——
c.	Static control wrist strap	——	——

10. PROCEDURE TO BE PERFORMED BY. This modification is to be performed by field maintenance personnel or as determined by the regional Airway Facilities division manager.

11. WHEN MODIFICATION IS TO BE PERFORMED. This modification is to be performed as soon as possible after receipt of this chapter and the required materials.

NOTE FOR INSTALLATIONS RUNNING IN MODE-S MODE

This modification requires a corresponding modification to the MODE-S system (release SAR21.4F, SSM-MODES-002, Transmitter Power Interrupt and Blower Motor Fuse), because the manner in which the two systems "handshake" and exchange data is being fundamentally changed. Due to architectural limitations in the MIP firmware, it was not feasible to support both new and old interface implementations in the same set of chips. Consequently, once this modification has been installed in the ASR-9, a MODE-S running releases SAR21.4C (SPB-MODES-007, Mode Select Beacon System Terminal Software SAR21.4C Upgrade) or SAR21.4D (SPB-MODES-013, Mode Select Beacon System Terminal Software Upgrade) will not be able to exit IBI.

If the site traffic control requirements preclude temporarily running in IBI mode until both systems have been upgraded, then MODE-S release SAR21.4F will have to be installed first, because the MODE-S architecture allowed both new and old interface implementations to be supported in the same software image. A new Site Adaptable Parameter (SAP) is provided to select which interface implementation will be used. The MODE-S SAP can therefore be changed from its old setting to its new setting upon completion of this modification. Refer to SSM-MODES-002 for more information.

12. ESTIMATED TIME REQUIRED. · This procedure will require one technician for 8 employee-hours.

NOTE: More employee-hours may be required if the travel time between local and remote sites is substantial. In general, the ASR-9 site modifications should require 4 to 6 hours, and the remote SCIP site modification should require 1 to 2 hours. Since this modification impacts both System Control computers, scheduled downtime is required. It is recognized that modifying both local and remote sites in the same shift, or even the same day may not be feasible at all field sites. In this case, the local site should be modified first, and the remote site modified second.

13. DISPOSITION OF SURPLUS PARTS. Return the surplus EPROMs and lexan covers to the National Airways Systems Engineering Division, AOS-200, Branch 270. Use the shipping materials and address labels provided with the modification kit. If the shipping labels are missing, please ship to the following address:

    William J. Hughes Technical Center
    AOS-200
    Atlantic City International Airport, NJ 08405
    Attn: AOS-270

14. PROCEDURE.

    NOTE: Review this entire procedure prior to beginning the modification.

    a. Initial Conditions. If the site is operating with MODE-S online, place that system in IBI mode. The MODE-S is to be kept in IBI mode until all radar site modifications have been completed.

    b. System Baseline Check (Post Processor). At the local site, check the status of each target channel prior to performing the modification.

        (1) Verify that no Summary Alarms (SA) exist in the post processor. Use RMS ALARM REPORT menu (0.2). The presence of alarm 61B (Correlated Real-Time Quality Control (RTQC)) is acceptable if the online transmitter high voltage is currently off. Maintenance Alerts (MA) are allowable.

        (2) Run FIT on the post processor. Use menu 0.4.1 and select command number 5.

    c. System Check - Spare MIP Circuit Card Assembly (CCA).

        NOTE: use ESD and wrist straps when handling CCAs. Always store and transport boards in antistatic bags.

        (1) Refer to TI 6310.26, ASR-9 System, Radar Receiver/Processor Channel A, Radar Receiver/Processor Channel B, paragraph 7.5.8, Dual Card Rack A4 Boards, for the removal and installation procedures.

        (2) Remove the MIP board (slot 207) from the offline channel and install the spare.

(3) Perform System Baseline Check in paragraphs 14b(1) and 14b(2) to verify that no alarms exist with the spare CCA.

d. MIP Board Modification. The following is the recommended procedure for modifying all three MIP boards:

(1) Refer to TI 6310.26, paragraph 7.5.8 for the removal and installation procedures for the card rack A4 boards.

(2) Using the MIP board currently not in the system, remove the 6 EPROMs at U30, U31, U50, U51, U60, and U61. Replace them with the new chips provided in the modification kit. If you need help in identifying the location of these EPROMs, refer to TI 6310.39, ASR-9 System, Figure 11-58, Message Interface Processor Board Assembly 2A4A207.

(3) Put this modified board back into the channel currently containing the spare board.

(4) Perform the steps in paragraphs 14b(1) and 14b(2) to verify that no faults exist with this modified board. After FIT completed, leave in unavailable mode for the following VSP and Performance Alarm Filter (PAF) checks.

NOTE: Sites operating with MODE-S may notice the appearance of alarm 658 (MODE-S Readback), which was not present before modification. This happens because MODE-S has not yet been configured for the new interface. Also, alarms 600 through 607 (BTD self tests), and 61F (ASP Alive) are no longer expected to appear during post processor startup (see paragraph 5r).

(5) Use RMS to verify all Correlation and Interpolation (C&I), Beacon (BTD/BRP), Surveillance Processor (SP), and ASP/MI VSP values against the site data listing.

(6) Change the PAF value (in the modified MIP board) for alarm 659 to 1/1. Ensure that the PAF value for alarm 658 is currently set to 1/1.

NOTE: This modification adds a new alarm, 657, which will not be accessible until RMS modification is done. This modification automatically sets the PAF value for alarm 657 to its default value of 1/1 when it powers up for the first time.

(7) Modify the spare MIP board as in paragraph 14d(2).

(8) Use RMS or System Control to switch the online channels.

(9) Put the modified spare MIP board into the channel containing the remaining unmodified MIP board.

(10) Perform the steps in paragraphs 14b(1) and 14b(2) to verify that no faults exist with the modified spare board. After FIT completed, leave in unavailable mode for the following VSP and PAF checks.

NOTE: Sites operating with MODE-S may notice the appearance of alarm 658 (MODE-S Readback), which was not present before modification. This happens because MODE-S has not yet been configured for the new interface. Also, alarms 600 through 607 (BTD self tests), and 61F (ASP Alive) are no longer expected to appear during post processor startup (see paragraph 5r).

(11) Use RMS to verify all C&I, Beacon (BTD/BRP), SP, and ASP/MI VSP values against the site data listing.

(12) Change the PAF value (in the modified MIP board) for alarm 659 to 1/1. Ensure that the PAF value for alarm 658 is currently set to 1/1.

NOTE: This modification adds a new alarm, 657, which will not be accessible until RMS modification is done. This modification automatically sets the PAF value for alarm 657 to its default value of 1/1 when it powers up for the first time.

(13) Modify the remaining MIP board as in paragraph 14d(2).

(14) Put this modified MIP board back into its original position in the system.

(15) Perform the steps in paragraphs 14b(1) and 14b(2) to verify that no faults exist with this modified board. After FIT completed, leave in unavailable mode for the following VSP and PAF checks.

NOTE: Sites operating with MODE-S may notice the appearance of alarm 658 (MODE-S Readback), which was not present before modification. This happens because MODE-S has not yet been configured for the new interface. Also, alarms 600 through 607 (BTD self tests), and 61F (ASP Alive) are no longer expected to appear during post processor startup (see paragraph 5r).

(16) Use RMS to verify all C&I, Beacon (BTD/BRP), SP, and ASP/MI VSP values against the site data listing.

(17) Change the PAF value (in the modified MIP board) for alarm 659 to 1/1. Ensure that the PAF value for alarm 658 is currently set to 1/1.

NOTE: This modification adds a new alarm, 657, which will not be accessible until RMS modification is done. This modification automatically sets the PAF value for alarm 657 to its default value of 1/1 when it powers up for the first time.

e. <u>System Baseline Check (System Control)</u>.

(1) Verify that no summary alarms exist in either LSC or Remote System Control (RSC). Use RMS ALARM REPORT menu (0.2.8). Maintenance alerts are allowable.

(2) Run FIT on system control. Use RMS FAULT ISOLATION menu (0.4.1) and select command number 9.

f. System Check - Spare Circuit Card Assemblies (CCAs).

NOTE: Use ESD and wrist straps when handling CCAs. Always store and transport boards in antistatic bags.

(1) Power down the weather channel as follows:

(a) Use RMS SYSTEM CONTROL PANEL menu (0.1.1) and ensure high voltage is off for both transmitters.

(b) Use RMS Azimuth Pulse Generation (APG), MONITOR PANEL VIDEO AND STC SELECTION menu (0.1.3) and select internal APG, command number 3.

(c) At the weather channel's multivoltage power supply, switch the battery ON/OFF toggle switch to the OFF position.

(d) At the weather channel's multivoltage power supply, switch main power circuit breaker to the OFF position.

(2) Remove the SCI #1 board (slot 216) and install the spare.

(3) Remove the Control Panel Interface board (slot 219) and install the spare.

(4) Power up the weather channel as follows:

(a) At the weather channel's multivoltage power supply, switch main power circuit breaker to the ON position. The spare SCI#1 board may have different system state information than the board just removed. It may be necessary to transfer system control back to RMS, restart antenna rotation, etc.

(b) At the weather channel's multivoltage power supply, switch the battery ON/OFF toggle switch to the ON position.

(c) Use RMS APG, MONITOR PANEL VIDEO AND STC SELECTION menu (0.1.3) and select APG 1, command number 1.

(d) Use RMS SYSTEM CONTROL PANEL menu (0.1.1) and put high voltage on in the online transmitter. This step can be skipped if desired, until the LSC computer modifications are complete.

(5) Perform System Baseline Check in paragraphs 14e(1) and 14e(2) to verify that no alarms exist with the spare CCAs.

g. LSC Computer Modification.

NOTE: Use ESD and wrist straps when handling CCAs. Always store and transport boards in antistatic bags.

(1) Using the SCI #1 board currently not in the system, remove the 2 EPROMs at U20 and U30. Replace them with the new chips provided in the modification kit. If you need help in identifying the location of these EPROMs, refer to TI 6310.39, ASR-9 System, Figure 11-88, System Control Interface No. 1 Board Assembly 4A4A216.

(2) Using the Control Panel Interface board currently not in the system, remove the 2 EPROMs at U21 and U23. Replace them with the new chips provided in the modification kit. If you need help in identifying the location of these EPROMs, refer to TI 6310.39, Figure 11-89, Panel Interface Board Assembly 4A4A219.

(3) Perform the steps in paragraph 14f(1) to power down the weather channel.

(4) Remove the spare SCI #1 board currently in the system, and install the modified SCI #1 board.

(5) Remove the spare Control Panel Interface board currently in the system, and install the modified Control Panel Interface board.

(6) Perform the steps in paragraph 14f(4) to power up the weather channel.

(7) Verify that no faults exist with the modified board by performing the steps in paragraphs 14e(1) and 14e(2).

(8) Modify the spare SCI #1 board as in paragraph 14g(1).

(9) Modify the spare Control Panel Interface board as defined in paragraph 14g(2).

(10) Perform the steps in paragraph 14f(1) to power down the weather channel.

(11) Remove the SCI #1 board currently in the system, and install the modified spare SCI #1 board.

(12) Remove the Control Panel Interface board currently in the system, and install the modified spare Control Panel Interface board.

(13) Perform the steps in paragraph 14f(4) to power up the weather channel.

(14) Verify that no faults exist with the modified spare board by performing the steps in paragraphs 14e(1) and 14e(2).

(15) The modified spare boards are now the operational boards. The boards that were operating in the local system are now the spare boards. If you so desire, you can put the original boards back into the system.

h. Remote Monitoring Subsystem Modification. The following is the recommended procedure for modifying the RMS.

(1) Proceed to the RMS bay (unit 3). Power off the RMS bay using the main power circuit breaker located on the front of the cabinet.

(2) Remove any bolts holding the RMS 310 box (3A7) front panel to the RMS bay (unit 3). For help in locating, refer to TI 6310.27, ASR-9 System Remote Monitoring Subsystem, Figure 11-11, Central Processor Assembly A7 Removal/Installation.

NOTE: The following steps modify the RMS 310 box without removing it from the bay. If removal is preferred, refer to TI 6310.27, Section 7.5.3.3, Central Processor Assembly A7 Removal Procedure. When completed, resume activity at step 5 below.

(3) Pull the chassis slide holding the RMS 310 box out about 4 inches. This will provide a space behind the unit in which to work.

(4) Remove the back panel to the RMS bay (unit 3).

CAUTION: There are many sharp edges in and around the RMS 310 box. Use caution so as to avoid scrapes, nicks, and cuts to your hands.

(5) At the rear of the RMS 310 box, locate and remove the four screws which hold the cable assembly panel to the back of the unit. See appendix, figure 1.

(6) Carefully pull back the cable assembly panel from the RMS 310 box about 6 inches. It is not possible to pull it back any further because of many short cables internal to the unit which connect the cable assembly panel to the individual circuit boards in the RMS 310 box card cage.

(7) Most of these short internal cables need to be detached from their circuit boards. Care must be taken to properly identify each cable for reattachment after the modification is performed.

(a) When viewed from the sides, you can see that there are seven circuit boards in the card cage. However, two of these boards (the top and bottom) have piggy-back boards on them. Thus, when viewed from the center, there appear to be nine rows of boards. When identifying the cables that attach to these boards, row 1 refers to the top board and row 9 refers to the bottom board. See appendix, figure 3.

(b) Using a marker or pen, label and detach each of the following cables: 1L, 1R, 2L, 4L, 4M, 4R, 5, and 6L.

(c) Remove the two metal retaining brackets that hold the circuit boards in the card cage. It is not necessary to completely remove the screws holding the bracket in place. The bracket will slide up freely once the screws have been loosened (best results seen with long handled screwdriver). See appendix, figure 2.

(8) Remove the SBC 428 EPROM expansion board from row 7. If the board proves difficult to remove, use the retaining brackets removed in step 14f(7)(c) to provide additional leverage. Figure 3 identifies this as board 6.

NOTE: If the RMS 310 box was not completely removed from the bay for modification, taking out the SBC 428 expansion board can be made easier by carefully pulling back the whole 310 box and cable assembly panel a few inches. This should make enough room for sliding the board out of its slot.

(9) Remove the 12 EPROMs at U5P, U3P, U5N, U3N, U5M, U3M, U5K, U3K, U5J, U3J, U5H, and U3H. Replace them with the new chips provided in the modification kit.

(10) Put the modified SBC 428 EPROM expansion board back into the RMS 310 box. When seated properly, this board will be even with respect to the neighboring boards (must not be sticking out).

(11) Reinstall the two metal retaining brackets.

(12) Reattach all the short internal cables that were detached in step 14f(7)(b).

(13) Reattach the cable assembly panel to the RMS 310 box using the four screws removed in step 14f(5). If two are sheet metal screws and two are machine screws, then the sheet metal screws should go on the left side, as viewed from the rear of the box.

NOTE: If the RMS 310 box was removed from the bay for modification, replace it in the bay as described by TI 6310.27, Section 7.5.3.4, Central Processor Assembly A7 Installation Procedure. When done, resume activity at the next step.

(14) Turn ON the RMS bay (unit 3) using the circuit breaker on the front of the cabinet.

(15) At the local RMS terminal, verify that the System Confidence Test passes and the RMS LOGON menu appears. Version number 25.9 should appear.

NOTE: If problems exist with RMS operation after modification, verify that no pins were bent on the newly installed EPROMs, verify that all boards are seated properly, and verify that the internal cables are attached properly. In general, cable connection problems will manifest as RMS/SBC wrapback alarms. Refer to appendix, table 1 for a summary of internal cables, external jacks, and associated RMS interfaces.

(16) Push the RMS 310 box slide chassis back into the RMS bay.

(17) Put the RMS bay back panel back on.

(18) Logon to the local RMS terminal and enter the current time and date.

i. Site Data Listing Update. This modification redefines alarms 658 and 659, and creates a new alarm, 657. Consequently, the corresponding RMS alarm text (screen 0.2.6) and PAF entries (screen 0.7.4.6) must be updated in the site data listing.

j. MODE-S/ASR-9 Integration Check. At this point, all local site components of the ASR-9 have been modified. The following is a brief procedure ensuring that this modification integrates properly with the previously upgraded MODE-S system (Re: SSM-MODES-002). If no MODE-S exists at this installation, this section may be skipped.

(1) Verify that alarm 658 "MODE-S Activity Check," is present in both post processors. This is caused by the fact that when MODE-S is in IBI, and its "radar_type" SAP is configured for the old interface, then the digital interface between the two systems will be unused.

(2) Ensure that the ASR-9's data source control is configured for "Automatic ASR-9."

(3) Refer to SSM-MODES-002, appendix 10 for the procedure that configures MODE-S to interface properly with this modification. Be aware that appendix 10 also includes a sequence of post processor switches, DPS switch actions, and status checks at various display points in the MODE-S system. After the procedure is completed, MODE-S should be online.

(4) Verify that alarms 657, 658, and 659 are not present in either post processor. Be aware that alarm 658, "MODE-S Activity Check," will briefly appear whenever MODE-S is initializing, or performing an exit ATCBI command. This is a function of how long MODE-S takes to initialize (approximately 30 seconds).

(5) Reset the RMS computer, logon to the local RMS terminal, and verify that the time and date values are already set (i.e., no manual entry needed). Be aware that RMS will synchronize its internal clock with the MODE-S TOY clock at one hour intervals, regardless of the data source selection.

k. Remote System Control Computer Modification. The following is the recommended procedure for modifying and installing the SCC boards:

NOTE: Use ESD and wrist straps when handling CCAs.
Always store and transport boards in antistatic bags.

(1) Refer to TI 6310.31 ASR-9 System, Remote SCIP, paragraph 7.5.3.3 for the removal and installation procedures for the remote system control boards.

(2) Power down both channels of the Remote SCIP cabinet.

(3) Remove the SCI #1 board from slot A38. Remove the 2 EPROMs at U20 and U30. Replace them with the new chips provided in the modification kit. If you need help in identifying the location of these EPROMs, refer to TI 6310.39, Figure 11-88, System Control Interface No. 1 Board Assembly 4A4A216, for the location of these EPROMs.

(4) Remove the Control Panel Interface board from slot A44. Remove the 2 EPROMs at U21 and U23. Replace them with the new chips provided in the modification kit. If you need help in identifying the location of these EPROMs, refer to TI 6310.39, Figure 11-89, Panel Interface Board Assembly 4A4A219, for the location of these EPROMs.

(5) Put the modified SCI #1 board back into the Remote SCIP cabinet.

(6) Put the modified Control Panel Interface board back into the Remote SCIP cabinet.

(7) Restore power to the remote SCIP cabinet.

(8) Verify that no faults exist with the modified boards by running FIT on system control. Use RMS menu 0.4.1 and select command number 9.

(9) At both remote system control panels, replace the data source auto/manual lexan cover with the alarm silence lexan cover provided in this modification kit.

NOTE: The data source auto/manual lexan cover has a small triangular metal tab inserted in it. Do not remove this tab. The new alarm silence lexan cover does not require the tab.

15. TEST AFTER MODIFICATION. Not applicable.

16. RESULT OF MODIFICATION.

a. This modification, along with its MODE-S partner, addresses all known ASR-9/MODE-S interface problems discovered during the deployment of Order 6310.18, Chapter 18, Change 37 to the field. The ASR-9 should no longer keep "getting stuck" in the wrong mode of operation. Modem communication failures will no longer disrupt the ASR-9/MODE-S interface.

b. The status reporting and system availability reporting functions of the ASR-9/MODE-S interface have been greatly enhanced.

c. The ASR-9 and MODE-S systems now coordinate their switch actions, to speed up response times and avoid inappropriate delays. While either system can now bring the interface down in an orderly manner, only the MODE-S can bring it up (out of IBI).

d. Troubleshooting the ASR-9 and MODE-S systems will be enhanced because their respective fault logging functions are now synchronized to the same time source (GOES satellite timing via MODE-S TOY clock). This synchronization is performed automatically.

e. The ASR-9's alarm logging function improves the visibility of certain Remote SCIP switches. Also, the post processor has been modified to avoid generating myriad false alarms during start up initialization.

f. The ASR-9's remote system control panels now provide an alarm silence feature, thus reducing distractions in the control room. Also, the data source auto/manual selection is no longer accessible from the remote system control panels. The risk of system "hang up" due to panic command actions will be avoided completely.

g. The ASR-9 now supports maintenance and configuration checking with a new firmware version readback feature. While only RMS, Local SCC, Remote SCC, MIP A and MIP B now support this feature, future versions of the other embedded processors will also be compatible.

h. This modification, along with its MODE-S partner, ensures that the status message contains valid beacon channel alarm and online state information. The ASR-9 status message now uses a previously unused bit to indicate the beacon data source selection.

i. This modification of the ASR-9 requires MODE-S SAR21.4F (SSM-MODES-002). Due to architectural limitations in the post processor, this modification will not support MODE-S version SAR21.4D or earlier.

j. The MIP portion of this modification to the ASR-9 does not support the Phase 1 9PAC configuration currently in use at selected field sites. The next 9PAC modified post processor release will support all enhancements and fixes described above.

17. CHANGES TO INSTRUCTION BOOKS. Change pages will be delivered under separate cover with SDR-ASR9-001.

18. CHANGES TO INSTALLATION DRAWINGS. Not applicable.

19. CHANGES TO RECORDED DATA. Prepare FAA Form 6032-1, Airway Facilities Modification Record, showing this directive number and date to change recorded data.

20. ADDRESS CHANGES. Submit facility address, directive copy count, and additions/deletions changes to AOS-30 via ccMail.

21. CLARIFICATION OR COMMENTS. Not applicable.

22. STATUS ACCOUNTING. Perform both of the following status accounting activities:

    a. Ensure that the AOS quarterly NAS Equipment and EEM/SSM Status Report is updated to indicate the installation of this modification:

    b. Use Maintenance Management System (MMS) application Log Equipment Modification (LEM) function to report the completion of this modification. Verify that an "N" is in the "REP COD" field to ensure that the log will be upwardly reportable to the national data base for access by AOS.

23. RECOMMENDATIONS FOR CHANGES. Forward any recommendations for changes to this directive through normal channels to the National Airways Systems Engineering Division, AOS-200, Branch 270, on (609) 485-4357.

for James D Pritchard

George W. Terrell
Program Director for Operational Support

3-11-98
Date

LIST OF APPENDIXES AND ATTACHMENTS

Item	Description	Quantity
APPENDIX	SUPPORTING RMS ILLUSTRATIONS	1

APPENDIX. SUPPORTING RMS ILLUSTRATIONS

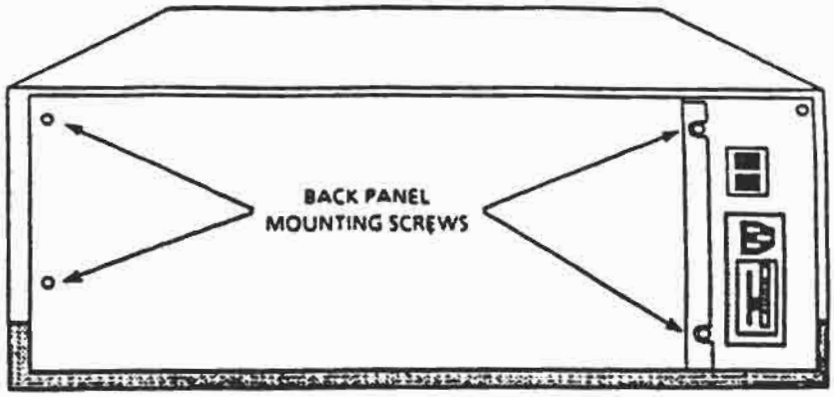

FIGURE 1.

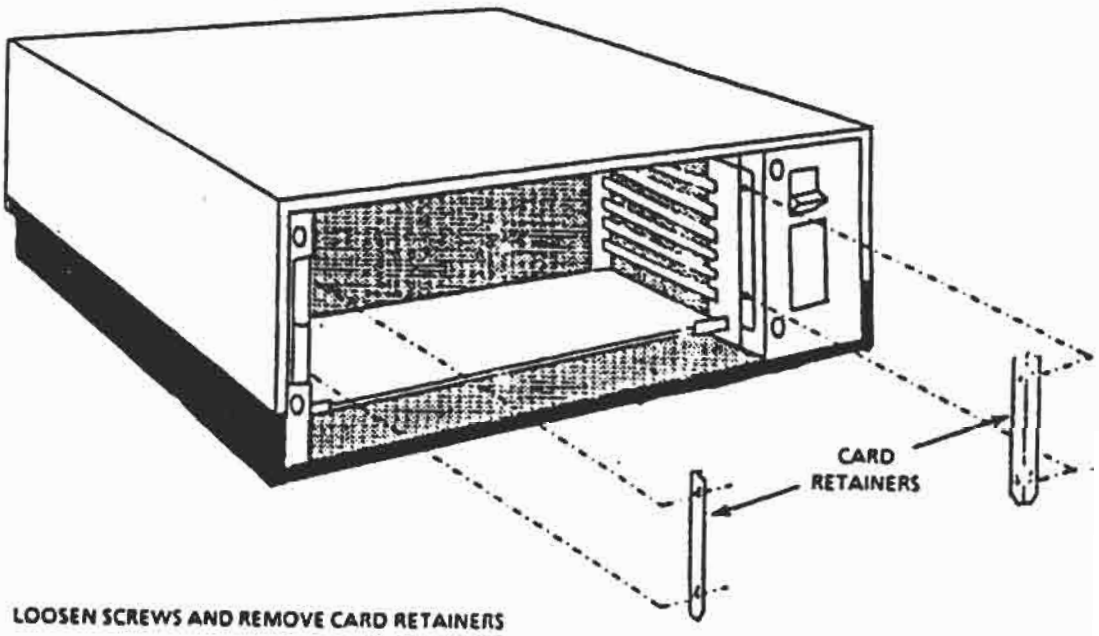

FIGURE 2.

RMS BOARD AND CABLE LAYOUT

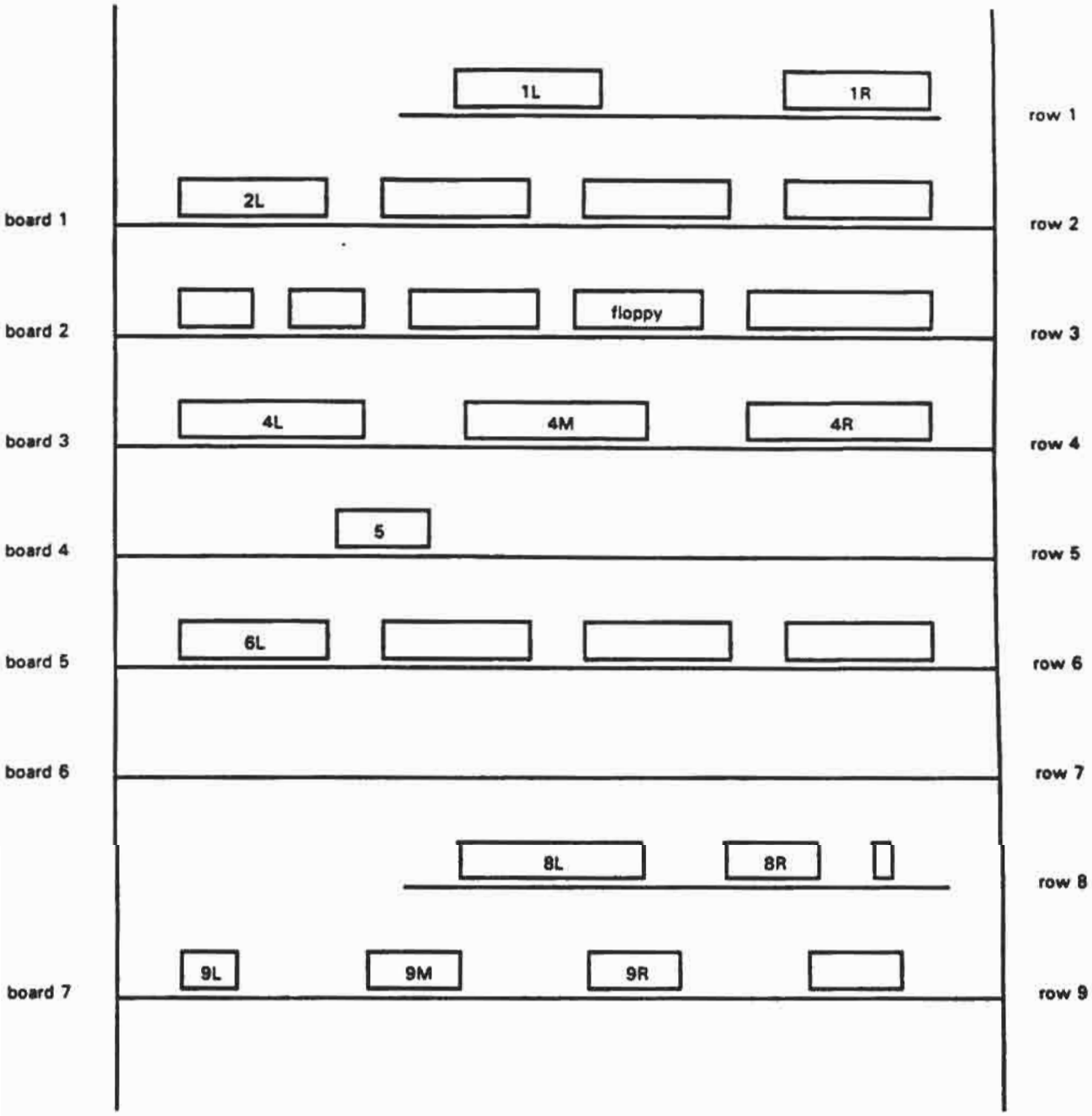

FiGURE 3.

TABLE. RMS 310 BOX CABLE/FUNCTION ASSOCIATIONS

INTERNAL CABLE LABEL	CORRESPONDING EXTERNAL JACK(S)	CENTRAL PROCESSOR ASS'Y INTERFACE
1L (left)	J2/J3 (split cable)	DSP/RM A, B (tgt ch)
1R (right)	J4/J5 (split cable)	ANS 1, 2 (if present)
2L	J1/J6 (split cable)	6WX/RM, Local SCC
4L	J11	Antenna Readbacks via RMS External Interface
4M (middle)	J12	Environmental Readbacks via RMS Ext. Interface
4R	J13	Environmental Readbacks via RMS Ext. Interface
5	J25	IEEE 488 (GPIB) Bus
6L	J15	MPS Interface (modem)
8L	J22	Environmental Controls and Readbacks via RMS Ext. Interface Assembly.
8R	J24	Remote Terminal (modem)
9L	J21	External Reset, and other special functions.
9M	J16	Local Terminal
9R	J27	Portable Terminal (if used)